EXHIBIT A

Hawley's

Condensed Chemical Dictionary

Fourteenth Edition

Revised by
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JOHN WILEY & SONS, INC.

This book is printed on acid-free paper.

Published simultaneously in Canada.

Library of Congress Cataloging-in-Publication Data:

Condensed chemical dictionary.
Hawley's condensed chemical dictionary.—14th ed./ rev. by Richard J. Lewis, Sr. p. cm.
Includes index.
ISBN 0-471-38735-5 (cloth: acid-free paper)
1. Chemistry—Dictionaries. I. Title: Condensed chemical dictionary. II Hawley, Gessner Goodrich, 1905– III. Lewis, Richard J., Sr. IV. Title.

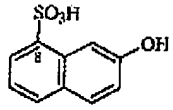
QD5 C5 2002
540".3--dc21 2001045614

Printed in the United States of America.

10 9 8 7 6 5 4

critical volume. The volume of a unit mass of a substance at critical temperature and pressure.

crocein acid. (croceic acid; Bayer's acid; 2-naphthol-8-sulfonic acid).



Derivation: Sulfonation of β-naphthol with 94% sulfuric acid at 95C and recrystallization from a salt.
Use: Azo-dye intermediate.

Crocein Scarlet MOO. See Brilliant Crocein.

crocetin. $C_{20}H_{24}O_4$. A dicarboxylic carotenoid derived from saffron.
Properties: Red, rhomboid crystals. Mp 285C. Soluble in pyridine and dilute sodium hydroxide; slightly soluble in water and organic solvents. Combustible.
Use: Experimental treatment of arteriosclerosis by increasing oxygen diffusion through arterial walls, thus decreasing buildup of cholesterol.

crocidolite. A type of asbestos. See asbestos.

crocking. Removal of a dye or pigment from the surface of a paint or textile by rubbing or attrition.

"Crodamal" *[Croda].* TM for fatty acid esters.
Grade: In liquid, solid, and flake forms.
Use: As emollient esters for skin care, sun care, and stick products.

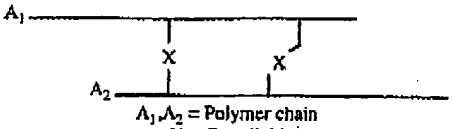
"Crodamide" *[Croda].* (Erucamide) TM for slip and mold release agents.
Use: Plastics casting.

"Crodamide OR" *[Croda].* TM for oleamide slip and mold release additive.
Available forms: Beads, powder, and pastilles.
Use: In manufacture of plastics.

Cross-Bevan (viscose) process. Production of rayon by treatment of cellulose with alkali and carbon disulfide to yield cellulose xanthate, solution in dilute caustic, and extrusion of the viscous "Viscose" into a coagulating bath, a 7–10% sulfuric acid solution containing 1–5% zinc sulfate and an active surface agent.

crosshead. A device attached to the head of an extrusion machine that permits the material to be extruded in opposite directions simultaneously at right angles to the barrel. It is applicable chiefly to coating of wire, cable, and small-diameter hose.

cross-linking. Attachment of two chains of polymer molecules by bridges, composed of either an element, a group, or a compound, that join certain carbon atoms of the chains by primary chemical bonds, as indicated in the schematic diagram.



A_1, A_2 = Polymer chain
X = Crosslinking agent

Cross-linking occurs in nature in substances made up of polypeptide chains that are joined by the disulfide bonds of the cystine residue, as in keratins, insulin, and other proteins. Polysaccharide molecules can also cross-link to form stable gel structures (dextran). Cross-linking can be effected artificially, either by adding a chemical substance (cross-linking agent) and exposing the mixture to heat, or by subjecting the polymer to high-energy radiation. Examples are (1) vulcanization of rubber with sulfur or organic peroxides, (2) cross-linking of polystyrene with divinylbenzene, (3) cross-linking of polyethylene by means of high-energy radiation or with an organic peroxide, (4) cross-linking of cellulose with dimethylol carbamate (10% solution) in durable-press cotton textiles. Cross-linking has the effect of changing a plastic from thermoplastic to thermosetting. Thus, it also increases strength, heat and electrical resistance, and especially resistance to solvents and other chemicals. See vulcanization; polyethylene; keratin.

cross section. (1) A measure of the probability that a nuclear reaction will occur. Usually measured in barns, it is the apparent (or effective) area presented by a target nucleus (or particle) to an oncoming particle or other nuclear radiation, such as a photon or γ-radiation. Also called capture cross section. (2) A section made by a plane cutting through a solid. Tissue cross sections are widely used for microscopic observation.

"Crosultaines" *[Croda].* (sulfobetaines). TM for tallow and coconut versions.
Use: Mild surfactants for baby shampoos, excellent for foam boosting, stabilization, and thickening.

crotonaldehyde. (2-butenal; crotonic aldehyde; β-methyl acrolein).
CAS: 4170-30-3. $CH_3CH{:}CHCHO$. Commercial crotonaldehyde is the *trans* isomer.
Properties: Water-white, mobile liquid; pungent, suffocating odor. Turns to a pale-yellow color in contact with light and air. A lachrymator. D 0.8531 (20/20C), bp 102C, flash p 55F (12.7C), fp –69C, vap press 30 mm Hg (20C). Very soluble in water; miscible with all proportions with alcohol, ether,

Other common grade designations are chemical, commercial, feed, food, injectable, nitration, purified, radio, research, semiconductor, spectro, technical (industrial chemicals).

graduate. A cylindrical glass container with etched volumetric gradations usually ranging from 5 to 100 or more milliliters.
Use: Measuring liquids in chemical and biological laboratories.

Graebe-Ullmann synthesis. Formation of carbazoles by the action of nitrous acid on 2-aminodiphenylamines, followed by decomposition of the resulting benzotriazoles.

graft copolymer. Polymer having branches of varying length made up of different monomeric units on a common truck chain.

grafting. A deposition technique whereby organic polymers can be bonded to a wide variety of other materials, both organic and inorganic, in the form of fibers, films, chips, particles, or other shapes. Grafting occurs at specific catalyst sites on the host materials, which must have some capacity for ion exchange, metathesis, or complex formation. Ionizable groups may be added artificially. One proprietary application is polymerization of acrylonitrile with wood pulp fibers to make synthetic soil blocks; the polymer imparts high water-holding capacity to the pulp. Plant nutrient materials are added and the mixture pressed into blocks to be used for starting seedlings.

graft polymer. A copolymer molecule comprised of a main backbone chain to which side chains containing different atomic constituents are attached at various points. The main chain may be either a homopolymer or a copolymer. This process may be applied to the union of cellulosic molecules (cotton, rayon) with synthetic polymers (except polyesters, acrylics, and polypropylene) to form modified fibers having improved flame-resistance, dimensional stability, resilience, and bacterial resistance. An intermediate called cellulose thiocarbonate is formed in this proprietary process.

See polyorganosilicate graft polymer.

Graham's salt. See sodium metaphosphate.

Graham, Thomas. (1805–1869). Born in Scotland, Graham is famous for his basic studies in diffusion that led to the development of colloid chemistry. He was the first to observe a marked difference in the rate of passage of certain types of substances through a parchment membrane. Those that readily crystallize, like sugar, pass rapidly through the membrane, but gelatinous types are "slow in the extreme." Graham designated the latter, which comprise albumin, starch, gums, etc., as colloids and their solutions as colloidal solutions. The former, which he called crystalloids, form "true" or molecularly dispersed solutions.
See colloid chemistry.

grain. (1) The smallest unit of mass in the avoirdupois system; 1 grain = 0.0648 gram; one ounce contains 437.5 grains. (2) Any cereal plant, as wheat, corn, barley, etc. (3) Crystalline particles of metals. (4) The dehaired side of a skin or hide.

grain alcohol. See ethanol.

grain oil. See fusel oil.

gram. (g). One one-thousandth kilogram. It is the mass of one milliliter (approximately 1 cubic centimeter) of water at 4C. One pound contains 453.5 grams.

gram atomic weight. The atomic weight of an element in grams; e.g., the gram atomic weight of oxygen is 15.994 grams.
See mole.

gramicidin. An antibiotic produced by the metabolic processes of the bacteria *Bacillus brevis*. It is a polypeptide that is active against most Gram-positive pathogenic bacteria. It is one of the two antibiotic components of tyrothricin but has been isolated and used alone.
Properties: White, crystalline platelets. Mp 229–230C. Soluble in lower alcohols, acetic acid, and pyridine; moderately soluble in dry acetone and dioxane; almost insoluble in water, ether, and hydrocarbons. Depresses surface tension, forms a fairly stable colloidal emulsion in distilled water.
Derivation: From tyrothricin by extraction with a mixture of equal volumes of acetone and ether, followed by concentration in vacuo and dissolving in hot acetone.
Grade: NF.
Use: Medicine (antibacterial).

gramine. [3-(dimethylaminomethyl)indole].
CAS: 87-52-5. $C_{11}H_{14}N_2$.
Properties: Shiny, flat needles. Mw 174.24, mp 138–139C. Soluble in alcohol, ether, chloroform; slightly soluble in cold acetone; practically insoluble in petroleum ether, water.

gram molecular weight. The molecular weight of a compound in grams, e.g., the gram molecular weight of carbon dioxide is 44.01 grams.
See mole.